The situation of electronic, information and communications technologies in France : current trends and future prospec

Marc Maurice

THE SITUATION OF ELECTRONIC, INFORMATION AND COMMUNICATIONS TECHNOLOGIES IN FRANCE :

CURRENT TRENDS AND FUTURE PROSPECTS

The economic, industrial and social perspectives against the background of economic globalisation

Marc MAURICE
LEST-CNRS

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1 – Introduction

There is a widespread consensus among experts as to the crucial importance of what are known as the "new information and communications technologies" (NICTs) for economic growth and employment in a new millennium characterised by the onward march of economic globalisation.

Undoubtedly, the areas of activity subsumed under the general NICT heading seem much broader than the definitions adopted for the international surveys associated with the Denki Rengo.

However, there is enough overlap between the various areas for them to serve as a backdrop to this report on the French situation in these sectors.

The report will deal in succession with the following points:

1. some observations on the definition of the technologies as a whole and their "comparability" across countries;
2. the French situation in the electronics, computer and telecommunications sectors, together with future trends;
3. the evolution of employment in the various sectors;
4. the industrial relations situation in these sectors : recent developments and new issues;
5. some findings from the Audit of french firms.

1 – Some observations on the nature of information and communication technologies and their statistical "comparability" across countries

These technologies (NICTs) are now commonly known as information technologies, a term now also readily associated with the notion of the information society.

Such notions undoubtedly encompass a relatively diverse and heterogeneous set of realities, not all of which are necessarily "new". Thus computers and data processing are "older" technologies than the Internet, and the distant origins of the Internet itself lie more than 30 years in the past.

On the other hand, what is relatively "new" are the "products" that have emerged out of the coming together of these different technologies and the uses to which they are put. We need merely mention the work "multimedia" and the various hybrid products that combine computers, telecommunications and television or the creation and diffusion of sound and image, the spoken and written word, associated with the mobile telephone.

It is also noteworthy that all these technologies are characterised by the ambivalence of the "products" associated with them : they are tangible and intangible goods, manufactures as well as services. This reflects a significant change in the nature and identity of such products. A further characteristic is their rapid obsolescence. Recent years, and those to come, have seen and will

continue to see considerable changes in what might be called the "technological landscapes"[1] associated with NICTs already alluded to above.

Analysts of these technologies think that what is also changing is the way we perceive them. Thus the technologies that have emerged to date have penetrated virtually every aspect of our lives without us always being able to identify them. This makes it difficult to combat the damage they might possibly do to human beings or to human society. "The age of the Luddites, when technological progress was held responsible for all the world's wrongs, seems to be over for good".[2] However, this does not mean that there are no social issues and responsibilities associated with these new technologies.

We shall attempt to identify them by reference to the following diagram, which depicts this new "technological landscape", which constitutes and reconstitutes itself almost continuously. (See Annex 1)

This diagram graphically illustrates the overlapping of the various technological fields alluded to above ("The field of information and communications technologies", in Information Technology and the Information Society, SESSI, 1999, p. 9).

It is not difficult to imagine the problems that might be encountered in attempting to define, measure and compare development in these technologies from one country to another across the world! There is much talk of the "new economy" that is said to underpin the information and communication (or knowledge) society. The complexity of such phenomena is further compounded by "globalisation", with all the attendant uncertainty as to whether the term refers primarily to economic and social phenomena or to political and ideological phenomena as well. In fact, of course, these notions encompass all these phenomena and have to be analysed as such. We will return to these questions in the conclusion.

The following report will be more modest in its scope. Our first aim is to put France's "technological landscape" into perspective, at least as far as the sectors adopted for the third phase of the surveys initiated by the Denki-Rengo are concerned, namely electronics, computers and telecommunications. Even a cursory glance at the statistical data corresponding to these "technologies" suggests that this task alone is a very complex one .

Although the focus of attention here is the French situation (reserving international comparisons for later), this will not prevent us from illustrating the French situation by locating it in the international context when possible.

2 – The situation of French manufacturing industry in electronics, computers and telecommunications

We will begin by providing a few general statistics covering all these technologies (ICTs), followed by some detailed figures on individual sectors and sub-sectors.

[1] Cf. Antoine Picon, "Quasi-objets techniques et paysage de la technologie contemporaine", Revue européenne des sciences sociales, 1997, pp. 247-256.
[2] A. Picon, op. cit., p. 253.

2.1 France's relative position in information and telecommunications technologies (ICTs)

French manufacturing occupies fourth place among the industrialised countries in the ICT industries (electronics, computers and telecommunications, excluding publishing and printing) in terms of sales and fifth place in terms of employment.

Whereas Japan and the USA dominate the computer and electronics industries in terms of sales, Europe is the leader in telecommunications, with the positions of France and Germany being comparable in this respect.

The ICT sector as a whole is very important in terms of international trade. In 1996, the value of trade in this area was 600 billion US dollars. Japan and the USA are the principal exporting countries, followed by the United Kingdom. Germany is in sixth position, and France in eighth position.

Broken down by sub-sectors (electronics, computers, telecommunications), Europe leads the USA and Japan in telecommunications, accounting for 40% of all exports, with the four leading exporters being Germany, Sweden and the UK, followed by France.

Although we cannot investigate in detail here France's position at international level in the various ICT sub-sectors, we will focus on two particular areas that illustrate the advances in information technology and their rapid diffusion, namely mobile telephony and the Internet.

Among the OECD countries, France was in sixth position in 1997 in terms of sales but was first in terms of the rate of growth in mobile telephony between 1996 and 1997. This trend has continued, since between 1996 and 1997, more than six million subscribed to mobile telephone services.

A similar trend can be observed in respect of Internet use. In 1998, France was in ninth position but had the highest growth rate of all the European countries. It was estimated that by 1998 approximately one million people in France would be subscribing to Internet service providers, putting the country in third position behind Germany and the UK. However, it is well known that France has been using the Minitel viewdata system since 1992, and by 1997 the service had more than 17 million users. Today, France-Télécom offers Minitel users access to Internet e-mail services through its Wanadoo provider.[3] Thus the Minitel system gave the French an opportunity to experience on-line services and e-commerce. The influence of Minitel on the Internet, and the extent to which it has facilitated or slowed down its diffusion, is a hotly debated question in France. In 1998, Minitel still retained its position, despite the growing interest in the Internet.

Be that as it may, the computerisation of firms themselves and their use of various communications tools is booming in France. In 1999, 99% of manufacturing companies were connected to mobile telephone networks, 75% had digital lines (ISDN), 40% had leased lines and 30% had voice mail systems.[4]

[3] See Information technology and the Information Society, SESSI, 1999, p.
[4] See SESSI, Les 4 Pages des statistiques industrielles, N°135 – August 2000.

As we shall see, all this contributes to the development of employment, not only in the ITC sectors but also upstream and downstream of these industries and services. This is illustrated particularly by development of on-line commerce on the Internet.

The deregulation of the telecommunications industry that is currently taking place in France will reduce costs and cannot but reinforce the trends observed to date.

As already noted above, the ICT sector is difficult to define and quantify as an autonomous entity. It encompasses a field that includes both manufacturing industries (capital goods, intermediate goods and consumer goods) and service activities (retailing and business services), making it necessary to use different statistical sources.[5] Thus considerable caution must be exercised in interpreting the quantitative data presented here, whether they relate to France or to other countries.

2.2 The industrial and employment structure in the ICT industry in France

Detailed below is the industrial structure (number of firms, turnover, output, import/export) of the various ICT sectors corresponding to those in the present Denki Rengo survey:[6]

	Number of people employed		Number of firms	
	1997	1999	1997	1999
Sector 1	35,852	36,142	60	65
Sector 2	69,686	67,732	208	210
Sector 3	46,007	43,941	291	296
Sector 4	17,882	18,197	54	54
Sector 5	70,262	67,958	187	543
Total	222,689	232,970	1,142	1,168

Sector 1 : manufacture of computers and of other IT equipment
Sector 2 : manufacture of broadcasting and transmission equipment and of telephones
Sector 3 : passive and active electronic components
Sector 4 : consumer electronics
Sector 5 : measuring and control equipment.

It should be noted that, in the case of sector 2 (telecommunications), only the "manufacturing" part of the sector has been taken into account and not the "service" part, which in France as in other countries is being deregulated (or privatised). The same distinction applies to sector 1 (computers), which includes manufacturing activities and services. The number of firms is rising in the first three sectors but the number of people employed is increasing only in sector 1, while it is falling in sectors 2 and 3. This reflects differences in technology and competitiveness from one sector to another.
Characteristics of the five sectors :

[5] Which explains why there are differences from one source to another, in respect of emp loyment levels for example. We will not deal here with questions related to evaluation methods. However, this too illustrates the difficulties involved in apprehending these technologies.
[6] More detailed figures will be found in the annex 2

Sector 1 (computers and IT equipment) :

In this sector, France lags behind both the USA and Japan (as well as other Asian countries) and the multinationals that have established themselves there.

The history of the sector in France helps to explain its relative weakness, but also its competitiveness in certain high value-added technological niches. In 1996 in France itself, Bull was ranked in only second position in terms of turnover behind IBM France. The main producers of computers and office machinery in France are American companies, namely IBM and Hewlett Packard; production in the sector is moderately internationalised. French firms make almost 60% of their sales in France. The export-import ratio is 74%, which does not necessarily accurately reflect the competitiveness of French manufacturers in this sector.

Sector 2 (Telecommunications) :

This is a rapidly expanding sector in which France is well placed. Companies in this sector enjoy a certain technological lead and have a high export rate: the trade surplus is 20 billion francs. It should be noted that telecommunications services are excluded here, with only manufacturers of equipment being included. The sector is dominated by four large groups: ALCATEL (one of the world leaders in telephony), THOMSON CSF (communications), MATRA and SAGEM. This is a sector that tends to be concentrated at national and international level in order to achieve the critical size that is a precondition for the often very high level of investment needed.

Sector 3 (Passive and active electronic components) :

The passive components industry is relatively unconcentrated, made up as it is largely of small and medium-sized firms, and employs a relatively high number of manual workers (more than in the motor industry!). Most firms in this sector are subcontractors for the major electronics companies. The active components industry, on the other hand, is expanding rapidly and in 1997 was made up of 14 large firms, two of which employed more than 2,000 people. It is also a high-skill sector (skilled manual workers, technicians and engineers).

There is also an emphasis on research. The companies include Thomson-Multimédia (this Franco-Italian consortium is the eighth largest consortium in the world), Matra, Gemplus, Philips Components, IBM-France and Motorola semi-conductors : clearly the multinationals have a significant presence here. However, Gemplus is the world leader in smart cards.

Sector 4 (consumer electronics) :

This sector is dominated by two multinationals, Philips and Sony, as well as by the Thomson group. It is highly concentrated (in 1997, the four leading companies accounted for 66.4% of total employment in the sector and for 81.2% of turnover). The sector employs both high-skill personnel and skilled workers in the assembly plants. Competition in the sector is intensive, and revolves around product innovation and the reduction of consumer prices.

Sector 5 (Measurement and control equipment) :

This is a very high-tech civil and military sector dominated by French companies (Thomson CSF, Sextant Avionique, Dassault Electronique and Schlumberger). France is well placed, since Thomson CSF is the leading world exporter of civil and military electronics. This company operates in partnership with Alcatel and Dassault Electronique in the fields of military communications and satellites. Their technicians and engineers account for almost two thirds of total employment in a sector in which R&D is also highly developed.

2.3 The ITC services sectors : firms and employment

Taken as a whole, these sectors account for a higher level of activity and employment than the purely manufacturing sectors outlined above, as the following figures indicate.

In 1998, those service activities falling within the scope of the ICT sectors accounted for a total of 377,420 jobs distributed among 184 companies. Of course these jobs are dispersed among a large number of small companies, with only 120 companies employing more than 1000 people.

These services are very heterogeneous across countries, particularly those linked to software.

France is one of the European countries where these services are most highly developed and most closely tailored to clients' particular needs, whereas Germany, for example, is geared more to the standardisation of software packages.

These services comprise telecommunications services, business consultancy services, software development and databank or data processing services (activities that manufacturing companies are increasingly outsourcing). The share of employment in these particular sectors rose in the fifteen years between 1981 and 1996 from 4% to approximately 20%.

As in manufacturing activities, services in the main ICT sectors can be broken down as indicated in the following table :

Services (firms with 30 or more employees) in 1998

	Computers	Telecoms	Audio-visual	Total
Number of firms	1,379	120	352	1,841
Numbers employed	161,920	189,729	40,541	392,190

It is clear from these figures that services in the ICT sector as a whole provide more jobs than manufacturing, and those jobs are distributed among a larger number of companies :

	Services	Manufacturing	Total
Numbers employed	392,190 (1998)	232,970 (1999)	625,160
Number of companies	1841 (1998)	1168 (1999)	3009

Thus the number of people employed in the ICT sectors as a whole (manufacturing + services) is more than 600,000, and they are distributed among some 3,000 firms. It should be

remembered, however, that the distinction between manufacturing and services is difficult to establish in the ICT sector, which is itself in a constant state of flux. The tangible products incorporate an increasing share of services (microcomputers/software), while service activities are increasingly incorporating industrial products associated with ICTs. Thus the statistical data have to be interpreted with caution, particularly in the case of international comparisons.

Furthermore, it should be borne in mind in any attempt to understand these expanding industries, whether manufacturing or services, that their common base is digitalisation. This phenomenon is undoubtedly the driving force behind their expansion, and this is reflected in the "digitalisation" of the economy.

It can be readily understood, therefore, that such a phenomenon may have important consequences for employment, in terms not only of numbers employed but also of skill content and occupations.

Over and above these factors, however, it also leads to changes in corporate organisation (whether in manufacturing or services), in the functioning of labour markets and undoubtedly also in the institutions of employee representation (trade unions) and social regulation (industrial relations systems). We will return to these various points later.

3 – Employment and skills in the ICT sector

National statistics make it very difficult to apprehend this sector, which is made up of manufacturing and service industries. There is also an increasing degree of hybridisation between products and technologies in this sector. Depending on the sources, therefore, the statistical data may vary.

We will provide some basic data on the evolution of employment in this sector, and examine the composition of the labour force and of skills in greater detail.

3-1 The evolution of employment levels :

	1981	1989	1996
Manufacturing activities (20 employees and more)	31,449	28,534	36,656
Service activities (30 employees and more)	97,203	193,771	254,247

It is services that are driving the evolution of employment. In 1996, they accounted for 87.4% of jobs, compared with 75.6% in 1981, and this trend continued in 1999.

According to INSEE and SESSI, in 1998 there were 1191 firms employing 272,543 workers engaged in so-called manufacturing activities in the ICT sector, while there were 1841 firms and 391,190 workers engaged in service activities. These last statistics differ from the previous ones

because they do not relate to the same types of activity. In both cases, however, the service sector is the larger.

The composition of the labour force in the ICT sector as a whole:

In 1998 the workforce in the ICT sector could be broken down as follows

- 21% skilled manual workers
- 10% unskilled manual workers
- 8% clerical staff
- 29% intermediate occupations (technicians and middle managers)
- 30% engineers and *cadres*.

We turn now to the structure of employment in the various ICT sectors:

- Computers (office and home computers, peripherals, boards etc.)
- Electronics (electronic components and consumer products)
- Telecommunications equipment (professional and for consumers)
- Measuring and control instruments (high-tech civil and military equipment)

1) Computers:

In 1998, there were 59 firms and 41,877 employees, of whom:

9% were skilled manual workers
2% were unskilled manual workers
6% were clerical staff
29% were in intermediate occupations, and
54% were engineers and *cadres*.[7]

This structure is representative of technologically advanced sectors. It should be noted here that R&D accounts for 15.7% of value added and that this sector employs more than 3,000 researchers (full-time equivalents).

As already noted, manufacturing and service activities exist alongside each other in this sector. These services include software development and the services associated with software and the marketing thereof (research, consultancy, installation, maintenance). The development of e-commerce cannot but contribute to further growth in the sector and the diversification of jobs and skills.

[7] In France, these two categories are often associated with each other, since the status of engineers, who are often graduates of the *grandes écoles*, is close to that of senior managers.

2) Electronics (components and consumer products)

This sector requires both a highly skilled labour force (active components) and less skilled workers (passive components and consumer products), labour requirements that are characteristic of mass production. However, activities linked to research and innovation require high-level skills, and there is a high share of engineers and researchers in the labour force (approximately 1 billion francs per year are invested in R&D).

3) Telecommunications equipments :

This is a rapidly growing sector but one that includes both large firms and small, subcontracting firms. The workforce in these smaller firms is less highly-skilled and there is less investment in research. However, some of these small firms have a relatively high capacity for innovation.

It is the large firms that employ the largest number of engineers and middle managers.

These firms are recruiting an increasing number of engineers, researchers and technicians to help them innovate and thereby remain competitive.

It should also be noted that the technical sales services provided by this sector are contributing to the diversification of jobs and skills.

4) Measuring and control instruments

This sector requires a highly skilled workforce; in consequence, *cadres* and engineers, together with the intermediate occupations (technicians and supervisory staff), account for two thirds of total employment (62%).

This sector has been through a period of considerable restructuring linked to the crisis in the European defence industry, and in France it consists of high-tech firms requiring an experienced workforce.

Some general remarks on employment and skill in the ICT sectors

The jobs and skills found in the ICT sector are those required by innovative technologies, combined in some areas with a less skilled labour force employed in mass production. Overall, 42% of employees in the sector in 1997 were in the high skill categories.

In the same year, about 57% of employees in the rapidly expanding service activities (software development, IT systems consultancy…) were under 35 years of age.

In 1997, 66% of all employees in the ICT sector were high-school graduates or had a vocational diploma, while 29% had a higher education qualification, compared with only 23% in 1993.

It should be noted that qualification levels are higher among men employees, because of the predominantly scientific nature of the jobs offered. In 1997, nevertheless, no fewer than one-third of jobs were held by women, the majority of them clerical or manual workers (45% in all). Similarly, the part-time rate is higher among women (16.5% compared with 1.6% for men).

Finally, most employees in the ITC sector are on permanent contracts. In 1997, 93.8% of the workforce in the sector were on permanent contracts, compared with about 88% in the economy is a whole.

However, this stability of employment status is combined with a relatively high rate of labour turnover of 30.5% in 1996. Being in a phase of rapid expansion, all these industries offer many employment opportunities for very highly skilled workers, many of whom have highly specific competences.

However, the frequent waves of restructuring in this sector - the French groups frequently adopt exogenous growth as a strategy - have led to redundancies. Thus the plentiful job opportunities do not always guarantee stability or security of employment.

4 The industrial relations situation (trade unions, employers, state) in the ICT sectors: recent developments and new issues

As we have seen, the ICT sector includes both manufacturing and service activities, as well as activities that have both a manufacturing and a service dimension. This is the background against which industrial relations develop. However, it is also the case that the various actors – trade unions, employers and the state – contribute to the structuring of the environment in which the ITCs themselves develop. Among these actors, it is of course the state and employers that play the leading role in this respect.

In France, in particular, the state has historically played a very important role in the structuring of the industries judged to be crucial to the country's economic growth and political independence. Thus the state, through its industrial policy, the nationalisation of some industries and the restructuring of others, as well as, indirectly, through its education and vocational training policies and even its industrial relations policy, has been able to influence, to a greater or lesser extent, the developing and structuring of the ITC sector, in the broad sense of the term.[8]

Over the last decade, there have been changes in the role of the state in this regard. Thus some companies have been privatised and entire industries have been restructured through both partial privatisations (with the state no longer being the principal shareholder) and alliances between firms in accordance with a plan drawn up by the state. This strategy has been applied in particular to certain areas of the computer, electronics and telecommunications industries, which are considered to be all the more important because they produce goods and services for military use or operate in areas where the notion of national independence comes into play. It is certain that entire sections of the ITC sector are involved here, since the sector as a whole plays a strategic role in this respect.

The historical context is also important for understanding the position of the companies themselves in the development dynamic of these strategic technologies and in the complex system of international alliances (at European and global level).

Trade unions in France ,till now, do not seem to have played an important role to date. In this respect, they seem to have focused rather on their traditional and, one might say, "defensive", functions, namely entering into disputes or negotiations when jobs or established rights have been threatened during the privatisations or restructurings occasioned by state plans. Between 1966 and 1971, and again between 1971 and 1975, the state implemented measures designed to increase the level of concentration in the IT industry in order to preserve French independence vis-à-vis the USA, measures subsumed under the term "Computation Plans"("Plans Calcul",in french).Against the background of these measures, many small software and computer services

[8] It should be noted that the state has also, in some cases, given financial support for acquisitions made with a view to restructuring in a strategic sector and has also supported R&D by establishing IT research centres (INRIA, ADI).

firms emerged, sometimes acting as intermediaries between state-owned French companies and American companies.

Without reviewing the history of these developments (see Nohara and Verdier, "The French IT Industry", February 2000 LEST-CNRS), we should at least point up the institutional and political context in which the trade unions have developed their own strategies and claims.

The unions have formulated these strategies and claims against a varied and fluctuating economic background characterised by successive periods of growth and recession leading, in the better times, to increased recruitment of certain categories of employees and, in more difficult times, to redundancies and social plans. Similarly, recent decades have seen radical changes in work organisation in firms as product and process innovations have been introduced.

Mention has already been made above of some of these changes as they have affected jobs and skills. We will underline here some of the impacts of these phenomena on trade union organisation and action by referring to one of the main French electronics and IT groups, Thomson S.A.

The FGMM-CFDT (Fédération Générale de la métallurgie et des Mines – General Federation of Metal and Mineworkers), which is taking part in the research initiated by DENKI RENGO, is one of the main trade union groupings representing workers in the Thomson group (particularly in Thomson-CSF and Thomson-Multimédia).

The FGMM-CFDT represents workers in a large number of manufacturing sectors with a total workforce of some 2,200,000. These sectors include INFELEC(a special organisation within the FGMM-CFDT for the computers and electronics sectors in which some 300,000 people are employed). (The figures refer to numbers employed, not trade unions members!)

The FGMM-CFDT main organisational principle (which is also shared by the various CFDT federations) is the decentralisation of responsibilities and of decision-making relating to the substance and form of trade union action.

INFELEC, which is of concern to us here, naturally adheres to this organisational principle. This means that the organisation of the CFDT is decentralised to the level of the individual firm or industrial group, as is the case with the Thomson group, Alcatel, Philips-France and IBM-France.

Thus the trade union structure at Thomson-CSF or Thomson-Multimédia, for example, is modelled on the organisational structure of these industrial groups. In other words, there are as many trade union branches or units (in french: "sections" as there are production or service providing units.

Similarly, at group or company level, there is, in addition to the staff representatives and works council, a CFDT branch that can play an important role in bargaining.

A pluralistic system of trade union representation exists in French companies, and all the most representative trade union "confederations" – the CFDT, CGT, FO, CGC and CSG – have a presence in the various ICT sectors (computers and electronics).

Union densities are, without exception, relatively low, although the trade unions still exert considerable influence, as is shown by the results of workplace elections (staff representatives, works councillors)

For example, at Thomson-Multimédia, the CFDT obtains 40% of the votes cast in workplace elections, putting it on a par with the CGT, although its constituency includes more engineers and *cadres*. The rate of union membership, in that company, on the other hand, is estimated at about 2%.In general the union density is less important in the private sector of the industry than in the

public. That situation exist also in the ICT industry, with an important discrepancy between the rate for professional elections and for the union's membership. In comparison with other union's Confederations, the CFDT, specialy in the ICT sectors have a stronger influence among engineers and managers in technical functions.

The major computer and electronics groups operating in France have group "works councils" at European level. This applies to Thomson, Bull, Sagem, Alcatel, Compaq-France and IBM-France.

Until now, these councils have operated as diffusers of information between the multinationals active in Europe. In particular, they seek to keep themselves informed about the various flows (of finance, products, jobs) between the European countries and between them and the rest of the world.

Similarly, in order to keep themselves informed of impending decisions on closures or restructurings, one of their objectives is to achieve some degree of harmonisation in European social legislation by attempting to introduce common clauses in group-level agreements or within multinationals.

One of the obstacles to the functioning of the European works councils that has already been identified is the language question.

The CFDT (INTELEC) takes the view that activities and functions at the European level are still underdeveloped.

At national level, the main demands are those relating to the reduction of working time, which have acquired a particularly high profile following the opening of negotiations on the 35-hour week.

Agreements have already been concluded in several of the groups, particularly within Thomson. That is in progress in other groups.

Increasing numbers of wage claims are being submitted on the grounds that the "fruits of growth" should be more evenly distributed. On the other hand, the negotiations on the 35-hour week have until now had a moderating effect on pay increases.

The improvement of working conditions is still one of the traditional claims in sectors that are experiencing frequent changes in work organisation as a result of technological innovation and the drive for productivity gains. Trade unions have conducted campaigns to foster employment and skills in "autonomous work zones" with a view to "enhancing operators' tasks".

Similarly, corporate restructurings and the redundancies they cause raise the question of retraining, and the trade unions are demanding training programmes for employees affected by these changes.

Mention should also be made of the incorporation into company agreements of special clauses providing for guaranteed career development or the regrading of trade union officials with large companies or groups. Such clauses have already been incorporated into agreements at Thomson-Multimedia, providing for 18 months' training for occupational reclassification, for example.

The data from these surveys is difficult to use in the case of France because of the limited number of responses to the questionnaires, with only 116 being returned. An additional survey is expected. So it is difficult to compare the french data with other countries of the Denki Rengo survey.The actual data are not representative of the working conditions and of the worker's consciousness in the ICT sectors.

Conclusions

The analysis of the french situation on the ICT sectors (industrial and services) underlines several trends both similar and specific, in comparison with other countries. We wish here note the main characteristics trends of this country in this respect. Because, it seems important to have in mind what the so-called "new economy" associated with the "new technology" of ICT are socially and historically "constructed" in each country. So the general trends are also "embedded" in different "social spaces" what generate the specificity of each country. That is an evidence in term of industrial and social policy, and also about the diffusion of technology. For instance the development of the ICT in France is connected with the historical importance of the state in the functioning of the economy , and the impact of these technologies on the employment and the skill of workers are in some extent also different in comparison with countries like the US, the Germany, the Hungary or the Japan. That reflection is also pertinent if we consider the "globalisation" of the economy. The different categories of "Social Actors" associated with the innovation's process in the field of ICT and their impact on the working conditions and the social relationships have to be analysed in the previous approach: the State, the Unions, the Companies , the skilled workers the engineers , all these actors are socially interdependent. And these Actors are also "socialised" in each country by specific educational system and specific form of division of work in the firm. The different survey organised by the Denki Rengo reveal that beyond some similar general trends. In this meaning we have to criticize the so-called "technological determinism" always present in the discussion on the "New Technologies of Information and Communication". The international comparisons are very important for that purpose specially to re-think the organisation and the content of the different actions and activities of the Unions, face to the changes of the political, economic and social contexts.

Bibliography

NoharaH.Verdier E.(February 2000),The french IT industry (first version),Lest-Cnrs,23p.

Statistical data:La situation de l'industrie, Enquête annuelle d'entreprise, 1998-1999, Secrétariat d'Etat à l'industrie, Ministère de l'économie et des finances, tomes 1, 2, 3.

L'enquête emploi de l'INSEE, 1998.

Information Technology and the Information Society, A statistical survey, SESSI, SJTI, INSEE,n°208, 1999.

Maurice M.,"Globalization and National Systems on Industrial and Employment Relations" , IIRA 12th Congress, Tokyo, 2000.

MauriceM.,A.Sorge(eds),(2000),Embedding Organizations, The Societal Analysis of Actors, Organizations and Socio-economic Context, Benjamins J., Advances in Organization Studies 4, 433 p.

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